

Practical Multi-Disciplinary Analysis Tools for Combustion Devices, Phase II

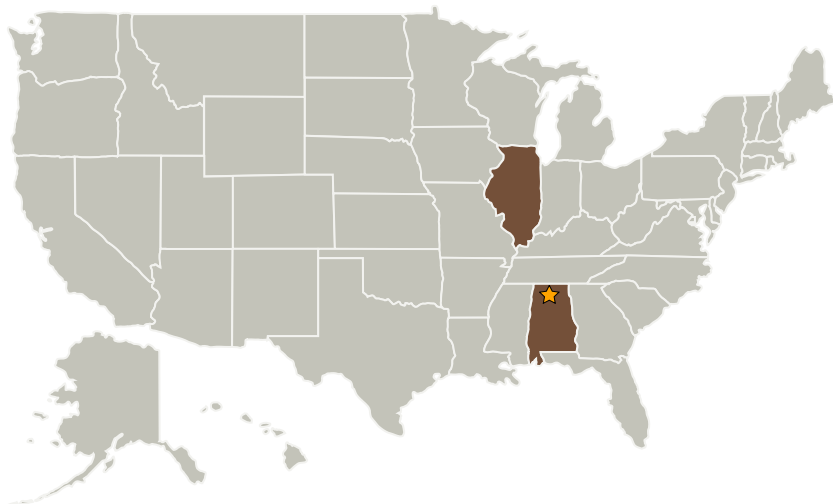
Completed Technology Project (2006 - 2008)



Project Introduction

The use of multidisciplinary analysis (MDA) techniques for combustion device environment prediction, including complex fluid mixing phenomena, is now becoming possible as numerical algorithms and high performance computing clusters become more powerful. Parallel solution methodologies and distributed memory architectures are currently available, yet the challenge of bringing highly sophisticated MDA research algorithms into a fast-paced NASA engineering environment still remains. In particular, continued improvements in current analysis tools and further validation of physical models are still needed to develop practical MDA capabilities. The product of our proposed Phase II effort will be an to compute turbulent, chemically reacting flows with coupled structural heating. Our unique approach, employing solution-based mesh refinement algorithms for generalized unstructured meshes, will provide NASA with the critical capability to solve fluid/structure interaction problems in a collaborative engineering environment. The developed software will be capable of generating both performance and multi-dimensional environments for rocket engine combustion devices. More specifically, it will support accurate and timely design analyses for all Exploration Vision propulsion systems combustion devices and will offer NASA a significantly improved, commercially viable analysis tool.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Tetra Research Corporation	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Princeton, Illinois

Primary U.S. Work Locations

Alabama	Illinois
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - └ TX11.4 Information Processing
 - └ TX11.4.4 Collaborative Science and Engineering